

We Claim:

1. A method for interacting an optical gradient field in three dimensions with a particle, comprising the steps of:

5 interfering two beams to generate a plurality of planar fronts,  
providing a plurality of particles in a medium, and  
moving the planar fronts relative to the particles,  
whereby the particles are separated at least in part based upon the dielectric constant of the particles.

10 2. The method of claim 1 wherein the interfering of the two beams utilizes two separate beams.

3. The method of claim 1 wherein the interfering of the two beams utilizes a single source to generate the two beams.

15 4. The method of claim 3 wherein the two beams comprise a direct and reflected beam.

20 5. The method of claim 4 wherein the reflected beam is reflected at an oblique angle to the mirror.

6. The method of claim 1 wherein the medium has a dielectric constant which is less than the dielectric constant of the particle.

25 7. The method of claim 1 wherein the planar front moves in a direction perpendicular to the interference planes.

8. The method of claim 1 wherein the planar fronts move through a volume.

30 9. The method of claim 1 wherein the particles and media are contained in a sample volume.

10. The method of claim 9 wherein the sample volume is a three dimensional volume.

5 11. A method for generating a moving optical gradient comprising the steps of:  
providing an array of sources,  
creating a moving optical gradient by selective operation of the sources,  
optically shaping the output of the sources, and  
illuminating a media containing a plurality of particles.

10 12. The method of claim 11 wherein the array of sources comprises a VCSEL array.

13. The method of claim 11 wherein the array of sources comprises a diode bar.

15 14. The method of claim 11 wherein the array of sources comprises an array of optical fibers.

20 15. The method of claim 11 wherein the optical shaping utilizes lenses.

16. The method of claim 11 wherein the optical shaping utilizes micromirrors.

17. The method of claim 11 wherein the array is greater than a 100 x 100 array.

25 18. The method of claim 11 wherein the operation includes selective activation of the sources.

19. The method of claim 11 wherein the operation includes selective modulation of the sources.

30 20. The method of claim 11 wherein the sources are in the near IR range.